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ABSTRACT

To guide districts through the process of creating workable technology plans, the Massachusetts Department of Education developed a set of benchmark standards that can be viewed as goals for districts to achieve by the year 2003. Based on findings from the most recent "Tech Plan Updates," the Department's online data collection system, this report tracks progress over the past four years and presents the state's current position in relation to the benchmark standards. The report is divided into the following sections: "Commitment to a Clear Vision," "Access," "Infrastructure for Connectivity," "Technical Support," "Technology Curriculum Integration," "Technology Professional Development," "Access to the Internet Outside the School Day," and "Technology for All Students." District statistics from Tech Plan Updates are discussed and given in a table at the end of the document, and include: student computer ratios, classrooms connected to the Internet, number of computers per 1 FTE technical support specialist, and number of staff per 0.5 curriculum integration. (AEF)

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# EdTech 2000

**March, 2001**

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## Introduction

Among the sweeping changes brought forth by the Massachusetts Education Reform Act of 1993 has been the expanding role of information technology in our public schools. With the growth of emerging technologies, and especially the Internet, technology's potential uses in the field of education have exceeded our wildest expectations. Since 1993, our public schools have increased spending on information technology from $30 million to over $200 million a year.

In working with districts to implement a state technology plan, the Massachusetts Department of Education has remained constant in its three goals. Those are to:

- enhance learning opportunities for all students;
- strengthen teachers' professional capabilities; and
- improve administrative efficiency.

Together we have achieved much. This year we are near completion of our statewide Information Management System (IMS). This Web-based data collection system has replaced more than 250,000 pieces of paper which districts previously had to file with the state each year. This system will provide, in a timely fashion, centralized information on all educators and students in the state. Districts can use this information to track student achievement and program results.

Launched this year is the first phase of Virtual Education Space (VES)[1], a publicly owned architecture for a K-12 e-learning system. VES will provide every public K-12 educator, student, and parent in Massachusetts with a free personalized electronic workspace. This workspace will function as a virtual desktop/hard drive and can be used to organize access to a set of curriculum, instruction, assessment, and communication tools. Accessible from any computer with a Web browser, VES will link teachers, students, and parents with a wide array of educational resources, including collections of standards-based lesson plans, online courses, and collaborative tools.

Just as technology has brought tremendous productivity gains to the business world, statewide technology-based systems such as VES and IMS have the potential to improve many aspects of our state's public education system. However, before we see the benefits of technology, there are a number of conditions that must be in place in every district:

- A local technology plan with a commitment to a clear vision and mission
- Ample access to fully-functioning computers
- High-speed connections to the Internet
- Adequate technical support
- Sufficient support for teachers in their efforts to integrate technology into the curriculum
- High quality technology professional development

[1] For more information on VES, visit the Web site, http://www.doe.mass.edu/edtech/ves

- Access to the Internet outside the school day
- Access to technology and curriculum for all students, regardless of abilities

School districts are responsible for creating and sustaining these conditions. The role of the Massachusetts Department of Education is to facilitate statewide initiatives and programs to help every district implement technology.

To guide districts through the process of creating workable technology plans, the Department has developed a set of benchmark standards[2]. These benchmark standards can be viewed as goals for districts to achieve by the year 2003. While many districts have already surpassed some of the benchmark standards, too many districts are still lagging behind. The Department's intent is to assist districts in meeting these standards within the next three years.

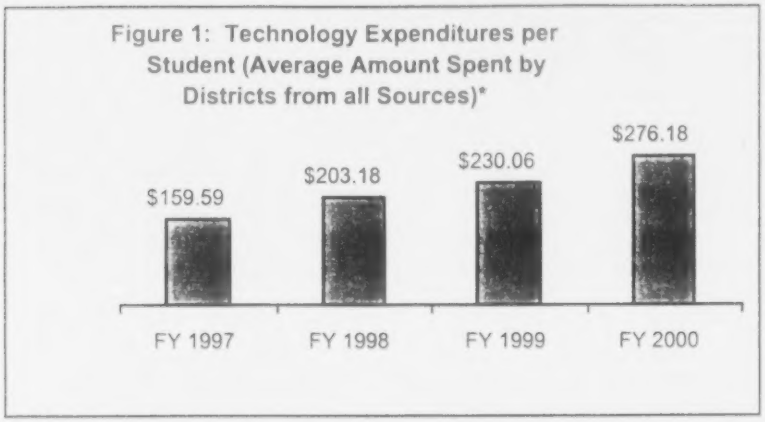
*EdTech Updated 2000* is structured around the benchmark standards. Based on findings from the most recent *Tech Plan Updates*, our online data collection system, this report tracks our progress over the past four years and presents the state's current position in relation to the benchmark standards.

## Commitment to a Clear Vision

To ensure that technology is implemented in ways that best align with local and state learning standards, each district needs a technology plan with a realistic and clearly stated set of goals. An important part of that technology plan is the district's commitment to sustained funding for technology through its operational budget.

It is difficult to say how much should be spent. The level of technology spending varies among districts, depending on many factors. Some districts are in an early stage of technology implementation, investing large amounts in hardware and network installations, while others may be focussing on professional development. In view of the wide range of spending by individual districts, the statewide trend has been moving steadily upward. Figure 1 shows statewide averages of technology expenditures based on district reporting over the past four years. Figure 2 shows the percentage of districts that fall into various spending ranges. The majority of districts spent more than $200 per student.

[2] Local Technology Plan Benchmark Standards for the Year 2003. The complete document can be downloaded in PDF format at http://www.doe.mass.edu/edtech/broad/sixstandards.pdf




* Includes funding from school committee, bonded technology, grants and other sources

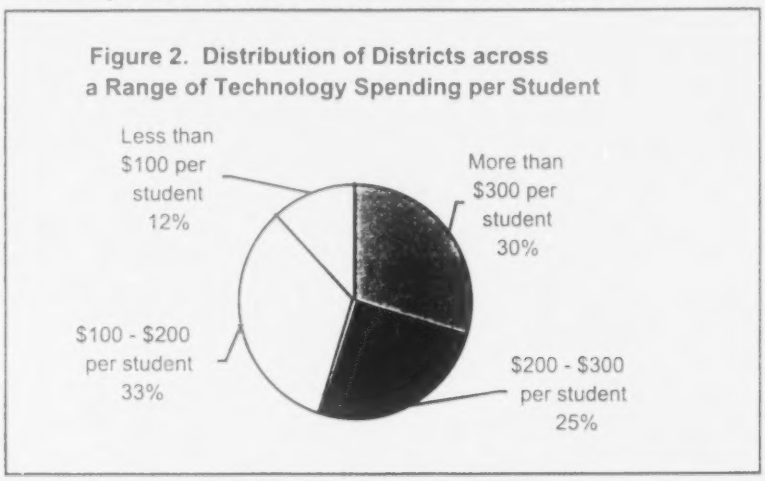


Figure 2. Distribution of Districts across a Range of Technology Spending per Student
Less than $100 per student 12%
More than $300 per student 30%
$100 - $200 per student 33%
$200 - $300 per student 25%

State and federal resources are available to provide seed funding and incentives to help districts jumpstart their technology programs. Over the long haul, however, each district needs to build and maintain its own technology infrastructure.

The following programs are designed to make technology more affordable for schools:

•The federal E-rate program provides substantial savings to schools and libraries on their telecommunications purchases.[3]

•Educational Technology Integration Services (ETIS) is a program, first launched in 1997, that helps public schools and libraries procure technology hardware and telecom services cost-effectively.[4]

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[3] The DOE has contracted with an independent, nonprofit organization, Mass Networks Education Partnership, Inc., to disseminate information on, and provide support for, the E-Rate. For information, visit the MassNetworks Website at http://www.massnetworks.org/

## Access

If students are to use technology in ways that enhance their learning, they should not have to wait long periods for a turn at the computer. If we invite high school students to use the Internet for a research project, we should provide them with updated computers and connections that have the capability of quickly displaying graphics and streaming data. In order for teachers to use their VES workspace productively, they too need access to high-speed, Internet-enabled computers.

The Department of Education recommends that, by the year 2003, every district achieve at least a 5:1 student-to-computer ratio of modern, fully functioning, Internet-enabled computers and devices. In determining this benchmark standard, the Department reviewed nationwide research. There is a general consensus among experts that a ratio of 4 or 5 students per high-speed computer is the minimum requirement for successful use of technology in schools.[5]

Based on data collected from the *Tech Plan Updates* [6] Massachusetts now has an average of 5.6 students per high-speed computer (see Figure 3). These are multimedia computers with CD-ROM and Internet capability using an up-to-date browser.[7] Approximately 36% of the districts have surpassed the ratio of 5:1 for these types of computers; a number of these districts have a 2:1 or 3:1 ratio.

Each year the specifications for computers that qualify as Type A and Type B are upgraded to account for new and faster processors. If a district has already reached the ratio of 5:1 for these types of computers, and does not allow for continuous upgrades, its student-to-computer ratio will fall below the benchmark standard, putting students at a disadvantage.

The district statistics listed at the end of this report show the ratio of students per Types A and B computer for each district. That ratio was drawn from the inventory of instructional computers reported on the school profiles of the *Tech Plan Updates*. For those districts that did not submit their *Tech Plan Updates* in the spring or fall of 2000, the data submitted the previous year was used.

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[4] For more information on ETIS, visit the Website: http://www.doe.mass.edu/etis/

[5] In 1994, when the U.S. DOE first established its goals for educational technology, 5:1 was the suggested ratio. For more information, see http://www.ed.gov/Technology/pillar1.html

[6] 96% of districts submitted their tech plan updates in Spring and/or Fall 2000. This ratio is based on data provided by those districts as well as data provided in 1999 districts that did not update in 2000.

[7] "Modern, fully-functioning, Internet-enabled computers and devices" are those defined in categories A and B of the Computer Workstation Inventory on the Tech Plan Update forms. During the period we collected these data, Type A represented processors having at least 32-64 Meg RAM, with either Windows 95/98 or Mac Os8.x operating system. The Type B processor was defined as having at least 16-32 Meg RAM and the operating system Windows 95/98, Mac OS 7.6 or more recent versions. Type C computers were those with 8-16 Meg RAM and either Windows 3.1 or Mac OS 7.0 operating systems (or earlier versions).

The statewide average of students per high-speed computer is very near our benchmark standard of 5:1. In fact, many districts have surpassed that ratio and are providing superior access for their students. However, as seen in Figure 3, almost two-thirds of the districts continue to show ratios of more than 5 students per computer. If these districts take full advantage of the cost-savings offered by ETIS and the E-Rate program, they too will be able to provide a lower student-to-computer ratio.

**Figure 3. Number of Students per Computer (Statewide Averages)**

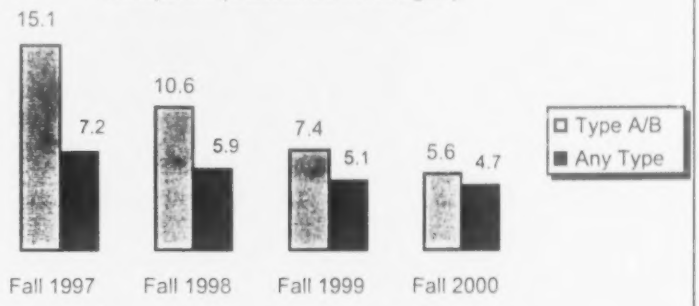
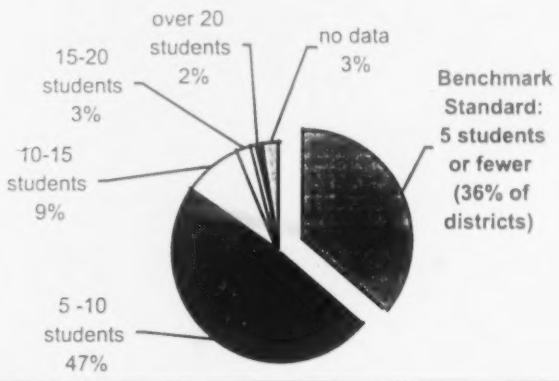



**Figure 4. Distribution of Districts across a Range of Student-to-Computer Ratios**


over 20 students 2%
no data 3%
15-20 students 3%
10-15 students 9%
5 -10 students 47%
Benchmark Standard: 5 students or fewer (36% of districts)

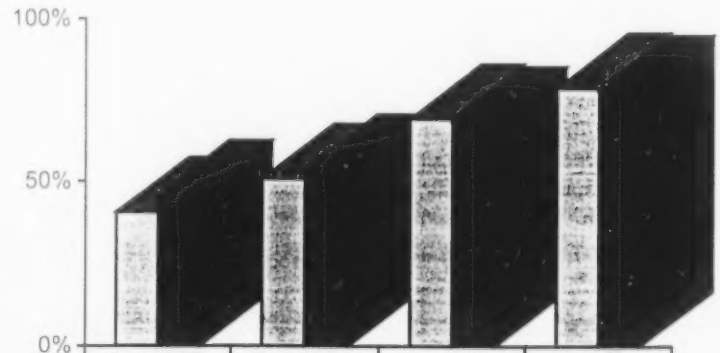
## Infrastructure for Connectivity

In our interconnected world of e-commerce and e-government, educators now speak of "e-learning." As more and more schools provide their students with classroom experiences using the Internet, it becomes increasingly important for all schools to do so. All students in Massachusetts should have equitable opportunities to develop technology skills that will help them compete in the workplace.

As one of the benchmark standards, the Department recommends that every classroom and administrative office have at least one computer with a high-speed connection to the Internet by the year 2003.

The most recent data collected from schools throughout the state reveal that 79% of classrooms in the state have some type of Internet access. As shown in Figure 5, this percentage has steadily increased over the past four years indicating that Massachusetts is moving steadily toward the goal of 100% connectivity.

**Figure 5. Percentage of Classrooms with Connections to the Internet and a LAN**

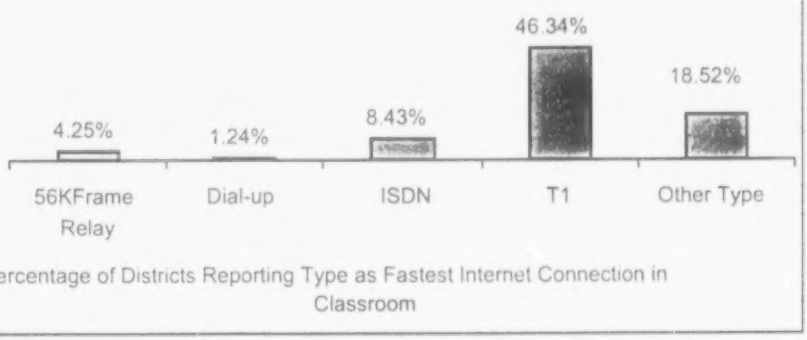



| | Fall 1997 | Fall 1998 | Fall 1999 | Fall 2000 |
|---|---|---|---|---|
| Internet access | 41% | 51% | 69% | 79% |
| LAN | 46% | 54% | 69% | 78% |

However, it is the speed and quality of Internet access that is critical. Most would agree that a dial-up modem, connecting at 56Kbps, is inadequate in this age of streaming video, animated

Web pages, and rich multimedia content. Broadband access, with a data transfer rate of 1.544Mbps (the speed achieved via a T-1 line and other methods) is currently considered the standard for optimum use of the Internet. Figure 6 shows the types of access that were reported by schools as the fastest connection in classrooms that are connected to the Internet.

**Figure 6: Types of Access in Classrooms Connected to the Internet**




Percentage of Districts Reporting Type as Fastest Internet Connection in Classroom

**56K Frame Relay** is a packet-switching protocol mainly used for connecting devices on a Wide Area Network (WAN). These frame relay networks support data transfer rates at speeds comparable to T-1 (1.5 Mbps) and T-3 (45 Mbps). Frame relay allows districts to utilize existing T-1 and T-3 lines owned by an Internet service provider even if the schools are connecting with 56K modems.

**Dial-up** refers to a modem connection via a public telephone line. Dial-up access is similar to a phone connection, with the exception that data, rather than voice, is being exchanged. Because this type of access uses normal telephone lines, the quality of the connection is sometimes poor and data transmission rates can be slow. Traditionally, 56K was the fastest speed that could be obtained with a dial-up modem. Now it is possible to gain better quality and faster throughput by leasing a line, which provides a permanent connection between two computers or devices, or by using ISDN.

**ISDN** (Integrated Services Digital Network) is an international communications standard for sending voice, video, and data over digital telephone lines or conventional telephone wires. ISDN supports data transfer rates of 64 Kbps. However, by using two lines at once that rate can be doubled.

**T-1** is a dedicated connection supporting data rates of 1.544 Mbits per second. T-1 is currently considered the state-of-the-art for districts planning to wire their buildings for Internet access. A T-1 line actually consists of multiple channels, each of which can be configured to carry voice or data.

**Other Types** of access include broadband service through a cable modem and DSL lines. Cable modem was listed most frequently by districts in the *Tech Plan Update*.

Districts were not asked to report the number of Internet connections in each classroom, but rather, the fastest connection. Although the benchmark standard recommends that every classroom have at least one computer connected to the Internet, many believe that just one connection is inadequate if Internet-based activities are to have a positive impact on learning. The benchmark standard for computer access (5:1 ratio of students per "modern, fully functioning, Internet-enabled computers and devices") in effect serves as a standard for Internet connectivity. Forward-thinking districts, in their plans to wire schools for Internet access, are providing multiple active drops in each classroom. They are planning ahead for the day when the Internet is such an integral education tool that even a 5:1 ratio is no longer considered workable.

For many districts the federal E-Rate program and ETIS have helped reduce costs of providing high-speed connections in classrooms. During 1999-2000, 62% of the districts reported using E-Rate. Seventy-eight percent of the districts used ETIS for hardware and telecom services. MassEd.net, the state's low-cost Internet access service for educators, currently serves over 25,000 teachers statewide, and 22% of the districts report that they are providing this service for their teachers.[8] MCN (Massachusetts Community Network), funded by the state, connects schools, libraries, and community centers with dedicated telecommunications services at below-market rates.[9]

## Technical Support

Keeping the computers and networks up and running is crucial to successful technology implementation. It is the district's responsibility to ensure that administrators, teachers, and students receive high-quality user and system support. As a benchmark standard, the Department recommends that, by the year 2003, there be at least one FTE (full-time equivalent) staff person to support 100-200 computers.

This standard appears modest, bearing in mind that, in a business environment, one full-time computer support person is generally provided for every 50-75 users.[10] Even if districts could afford that level of technical support, the business model may not be an appropriate one for schools to follow, since schools typically have much higher user-to-computer ratios. Yet, in education, as elsewhere, technology requires a support system that keeps the equipment working with minimal downtime.

The benchmark standard of one FTE (full-time equivalent) technical support person for 100-200 computers was based on an estimate of the needs of an average-size school. However, needs

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[8] For information on MassEd.Net, go to www.massed.net

[9] For more information on MCN visit the Website, www.masscommunity.net

[10] *Taking TCO to the Classroom: A School Administrator's Guide to Planning for the Total Cost of New Technology*, a 1999 white paper issued by the Consortium for School Networking http://www.cosn.org/tco/project_pubs.html

vary among districts and there may not be one simple formula that works for every district. In any case, it is important that districts should provide enough technical support to maintain the computers and networks installed. To meet the benchmark standard of five students for every computer, those computers must be up and running. If they are down 25% of the time, the district is not adequately maintaining a 5:1 ratio.

On the *Tech Plan Updates*, districts were asked to report the number of full-time equivalent (FTE) network/technical support personnel including network (or system) manager (or coordinator) as well as maintenance and repair specialist. They were also asked to indicate whether these services were provided by district staff, contracted services, or other (volunteers, students, aides, and paraprofessionals). We used these data to calculate the average number of computers that are serviced by one FTE technical support personnel in each district. The statewide average is 1 FTE technical support person (district staff only) per 372 computers. When contracted services are added in, the number of computers serviced by one FTE technical support person is reduced slightly to 358.[11] When "other" sources of technical support are included the number of computers serviced by one person is 319. Even when all the sources of technical support are considered, the number of computers maintained by one person is quite high.

As shown in Figure 7, only 18% of districts have achieved or surpassed the benchmark standard of 1 FTE technical support for 100-200 computers. Twenty-eight percent reported over 500 computers serviced by 1 district FTE technical support, with another 17% reporting no district technical support personnel.

[11] The ratios listed for each district at the end of this report include both district staff and contracted services.

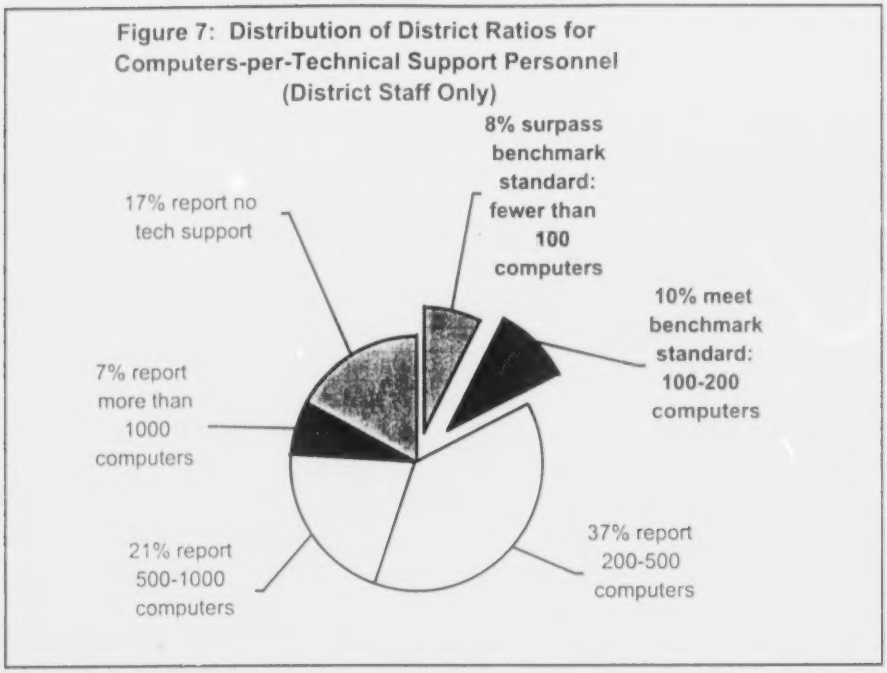
Figure 7: Distribution of District Ratios for Computers-per-Technical Support Personnel (District Staff Only)
8% surpass benchmark standard: fewer than 100 computers
17% report no tech support
10% meet benchmark standard: 100-200 computers
7% report more than 1000 computers
37% report 200-500 computers
21% report 500-1000 computers

Only a small number of districts reported using other sources (volunteers, students, aides, paraprofessionals) for technical support. However, a growing number of districts are discovering the benefits of programs in which students gain expertise as technical repair specialists and are hired by schools to provide supplementary technical support. One of the TLCF grant programs, *Students as Technology Leaders*[12], helps districts establish technology training programs to prepare high school students for leadership and educational achievement by helping them run computer enterprises that serve their schools and communities.

## Technology Curriculum Integration

There are still many teachers who are not ready to use technology in their teaching because they have not had the time to explore resources or effective models for using technology in the classroom. This is perhaps the single most important area in which districts should focus their technology planning. As school districts design local curriculum guidelines to reflect the state learning standards, they should include the integration of technology into that curriculum. Hopefully in the future, all new teachers will graduate from college with the skills to integrate technology effectively into their teaching. However, this is not yet the case. It is not enough for teachers to take isolated technology training workshops or for students to learn applications

[12] For more information, see http://www.doe.mass.doe/edtech

outside the context of their coursework. Although it is important to build these basic skills, mastering them in isolation does not always translate into technology-enhanced curriculum learning.

More and more districts are discovering the importance of having a staff person with technology and curriculum expertise (such as an instructional technology specialist or library teacher). This expert collaborates with classroom teachers to help both teachers and students learn technology skills within the context of curriculum activities. Recommended in the benchmark standards for the year 2003 is a minimum of 0.5 FTE (one half-time staff person) to support every 30-60 users (professional staff) in their efforts to achieve technology competency and to integrate technology into the curriculum. In calculating the ratios for "number of staff per 0.5 FTE curriculum integration," we have used only the district staff FTE that districts reported for curriculum integration specialist.[13] These ratios are drawn from data reported on the Baseline Data Collection Form[14] for the 1999-2000 school year. Based on these data, the statewide average is 39.13 staff members supported by 0.5 FTE curriculum integration specialist. More than half the districts report that they have achieved or surpassed this benchmark standard.

However, this finding conflicts with anecdotal evidence to the contrary. We know that many districts are struggling to provide enough curriculum integration support to teachers. There is a possibility that this statewide average is inflated because of a general misunderstanding of how to report FTE for this function. The *Tech Plan Update* instructs districts to count only that portion of a staff person's time that is devoted to a respective technology task. For example, a library teacher who works full time should not be counted as 1 FTE curriculum integration if that person spends only 25% of his/her time providing technology curriculum integration support to staff and 75% of his/her time working with students. However, if a full-time instructional technology specialist is providing guidance and curriculum integration support to staff 100% of his/her time, then that person should be counted as 1 FTE. It is highly likely that many districts counted a full-time library teacher as 1 FTE, even though that person works with students a good portion of the time. In the future the *Tech Plan Update* will be revised to make this section clearer, resulting in more reliable data.

Even if our findings are correct, there are still many districts in which curriculum integration support is not sufficiently funded. Too often the curriculum integration role gets merged with technical support which in itself can be a time-consuming activity. If a technology specialist is charged with repair and maintenance, that person will not have much time left to assist teachers in integrating technology into curriculum projects.

Figure 8 summarizes the curriculum integration data gathered from districts for the 1999-2000 school year. Based on district reporting, 52% of districts meet or surpass the benchmark standard of 0.5 FTE curriculum integration per 30 – 60 professional staff. Thirty-six percent of the

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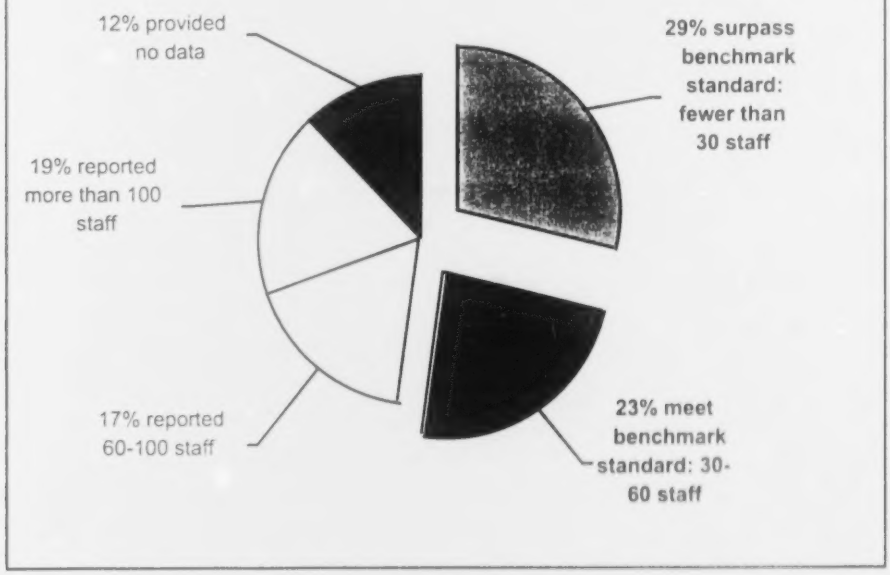
[13] We have not included technology aides, tutors, and volunteers that some districts listed as district staff under Curriculum Integration Support.

[14] The Baseline Data Collection Form is one of the online forms in the *Tech Plan Update*.

districts fall short of the standard, reporting more than 60 staff. Another 12% of districts either have no curriculum integration staff or provided no data. Statistics for individual districts are listed at the end of this report.

**Figure 8: Distribution of District Ratios for Number of Staff per 0.5 FTE Curriculum Integration Specialist**


12% provided no data
29% surpass benchmark standard: fewer than 30 staff
19% reported more than 100 staff
17% reported 60-100 staff
23% meet benchmark standard: 30-60 staff

The Department of Education offers a number of state and federally funded projects that help teachers integrate technology into the curriculum:

**Project MEET** (Massachusetts Empowering Educators with Technology) is a five year, $10 million technology professional development initiative sponsored by the federal Technology Innovation Challenge Grant Program. Project MEET trains school-based teams of teachers in which one team member is designated as a technology professional development (TPD) specialist who commits 50% of his or her time to providing support to peers in the district.[15]

**The Technology Literacy Challenge Fund (TLCF)** grants have been made possible through a five-year, $2 billion federal initiative that provides states with funds to support school districts.

[15] For more information on Project MEET, go to http://www.doe.mass.edu/edtech/teacher/projectmeet/

Since 1997, the state has distributed over $7 million annually to schools through these grants.[16] Federal regulations require states to distribute these funds through a competitive process. As a result, the Massachusetts TLCF grants are focused on catalyzing change in teaching and learning rather than supporting operations.

**Teaching State Standards with Technology (TSST)** is a competitive grant program funded by the state that provides matching grants to school districts and charter schools. The focus of this program is on adopting replicable practices in using technology to improve student achievement on curriculum aligned with the Massachusetts standards.[17]

## Technology Professional Development

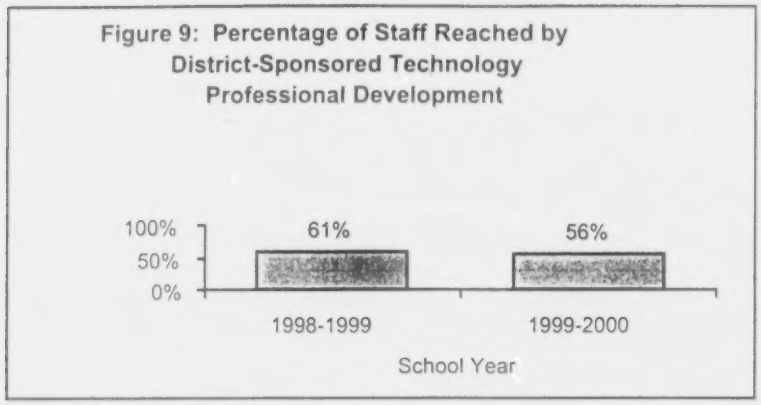
In order for technology to have a positive impact, teachers must know how to use it. One of the Department's goals is to ensure that, by 2003, at least 85% of district staff will have participated in technology training sponsored by the district.

On the *Tech Plan Update*, districts reported the percentage of district staff who have participated in technology professional development activities sponsored by the district since 1998. The statewide average so far is 61%.

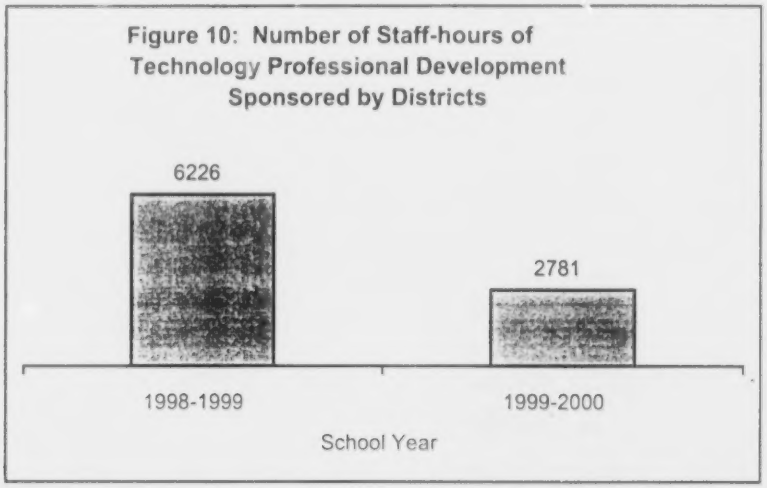
Figure 9 shows that during the 1999-2000 school year, 56% of district staff received technology professional development sponsored by the district. As compared to the previous year when 61% received training, this percentage has dropped considerably. A possible reason for this is that during 1998-1999 the state provided $15 million in funding for technology professional development projects. Rather than lose momentum after state support runs out, districts should continue to fund ongoing professional development activities, which are so vital to successful technology implementation.

[16] For more information on the TLCF grant programs, visit our website at http://www.doe.mass.edu/edtech/broad.html

[17] For information on this grant, go to: http://finance1.doe.mass.edu/grants/grants01/rfp-617.html




This drop is also evident in the statewide average for staff-hours of technology professional development activities, as seen in Figure 10. Districts were asked to include workshops, credit courses, mentoring, and study groups in their reporting. Staff-hours of informal training activities such as mentoring are difficult to count; however, we assumed that these were counted.




More than half of the districts (55.5%) reported that they provide informal types of technology professional development (such as coaching, mentoring, and co-teaching) that take place during class time. Among those districts, it was reported that 37% of staff members are reached by training activities in this manner.

Many of the TLCF grant programs address the issue of professional development and curriculum integration:

**Curriculum Sharing via Virtual Education Space (VES)** trains district staff to use the VES online tools, services, and resources so that they will be able to share curricular and instructional materials with other districts.

**The Technology Lighthouse Sites** disseminate existing classroom projects that incorporate new technologies with the state learning standards. The teachers who implemented these projects serve as mentors and their projects as models for other classrooms teachers.

**The Technology Mentor and New Teacher** grant helps districts to form mentoring teams composed of experienced, technology-using teachers and new teachers. The teams develop standards-based curriculum units that utilize portable technologies (e.g, writing tools, hand-held devices, projection systems).

**Adopting Best Technology Practices** is a grant through which schools obtain seed funding to adopt proven classroom practices and model professional development practices that integrate technology into the curriculum.

## Access to the Internet Outside the School Day.

Not every student or teacher in Massachusetts has an Internet-connected computer at home. If they are going to keep pace with their peers they need access after school hours. Although the "digital divide" has been, for the most part, resolved in Massachusetts schools, it still exists in homes. This is a serious equity issue that should be addressed by districts.

It is important that districts work with community groups to ensure that students and staff have access to the Internet, which will enable them to work outside of the school day. This was established as one of the benchmark standards for the year 2003. Statewide, 31.2% of districts reported that they work with community groups on this issue.

The Department of Education further recommends that districts maintain a catalog of places in the community ("points of access") where students and staff can gain access to the Internet after school hours. Only 7.2% of districts reported that they have an up-to-date catalog of information on how students can gain access to the Internet after school hours.

A small percentage of districts (12.8%) reported that they are collecting data on the numbers of students who use the Internet after school hours. A simple needs assessment is a good first step in a long-term strategy to ensure universal access for students and teachers.

The benchmark standards recommend that each district maintain an up-to-date Web site and that every educator have an Internet account with the capability of sending e-mail and accessing the World Wide Web. Seventy-six percent of districts provided a URL for a district Web site on their *Tech Plan Updates*.

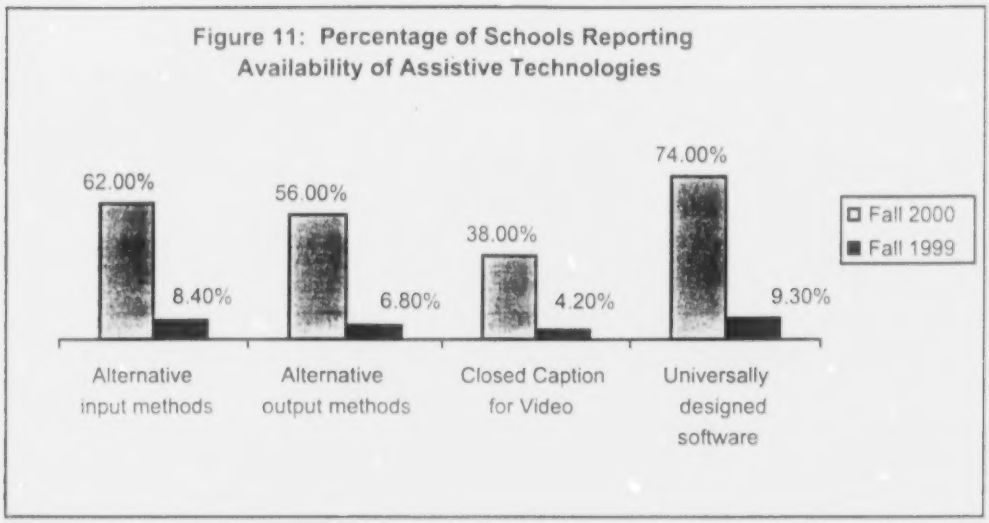
Through MCN (Massachusetts Community Network) every municipality in Massachusetts will be able to connect schools, libraries, and community centers with cost-effective, high-speed networks. With MassEd.Net any teacher in the state can have low-cost Internet access. VES will provide every student, teacher, and parent with their own free, personalized electronic workspace, which they can access from any Internet-connected device. The stage is being set for a future in which access to instructional technology resources extends beyond the school walls. All students can benefit from these opportunities, but only if districts partner with community organizations to make it possible.

## Technology for All Students

It is important that all students have equal access to the curriculum. Federal law mandates that assistive technologies be considered wherever appropriate for students with disabilities.[18] A district's budget should allow schools to purchase equipment and software that facilitate access to technology for students and staff with disabilities. Examples include high-tech devices such as alternative keyboard and mouse, large screen monitor, Braille printer, closed captioned TV, voice recognition software, and screen reader, as well as low-tech aids which can be as simple as Velcro and a pencil grip.

Schools were asked to report on the assistive technologies currently available for use in the classroom by students with disabilities. Ninety-seven percent of schools in the state reported that they consider accessibility for students with disabilities when purchasing technology. Figure 11 summarizes the availability of certain assistive technologies in schools statewide. The data from this year show a dramatic increase over the previous year in the availability of assistive technologies. This gain may be attributed to increased awareness of the federal law as well as increased professional development opportunities and dissemination of information and resources among districts.

[18] Information on the Technology-Related Assistance for Individuals with Disabilities Act (IDEA) can be found at http://www.ed.gov/offices/OSERS/IDEA/the_law.html




**Alternative Input Methods**: Examples include modifications to standard keyboards, touch screens, microphones, and switches.

**Alternative Output Methods**: Examples include speech synthesizers, large print output, refreshable Braille, or text-to-text speech.

**Closed Caption for Video**: Provides written text of video programs for deaf and hard-of-hearing students.

**Universally Designed Software**: Software designed to accommodate access by all, including persons with disabilities.

A Technology Literacy Challenge Fund grant, the *Assistive Technology Project,* has been helping school districts and collaboratives learn how to conduct assistive technology assessments and design appropriate classroom environments using a wide array of technologies. Additionally, Project MEET[19] works with teachers to educate them on issues of universal design. Many other organizations have been working across the state to spread information and expertise.

[19] More information on Project MEET (Massachusetts Empowering Educators with Technology, a grant sponsored by the federal Technology Innovation Challenge Grant Program can be found at the Website: http:www.doe.mass.edu/edtech/

## District Statistics from Tech Plan Updates

**Student Computer Ratios:** The ratio of students per Type A/B computer is based on the number of instructional computers of these types reported on the October 2000 individual school profile forms. The ratio of students per all types computers is based on the total number of instructional computers reported in all categories: Types A, B, and C. The enrollment figures used were those reported by the districts for the 1999-2000 school year. Enrollment data for the current school year are not available at the time of this report. For the most accurate and current student computer ratios, districts should recalculate the ratios based on the current year's enrollment. If enrollment has increased, then this will be reflected in a larger number of students per computer. The ratios reported here are based on data aggregated from the school profile forms. We advise districts to calculate a student computer ratio for each school to ensure equitable access across the entire district.

During the period these data were collected, Type A represented processors having at least 32-64 Meg RAM, with either Windows 95/98 or Mac Os8.x operating system. The Type B processor was defined as having at least 16-32 Meg RAM and the operating system Windows 95/98, Mac OS 7.6 or more recent. Type C computers were those with 8-16 Meg RAM and either Windows 3.1 or Mac OS 7.0 (or earlier versions).

**Classrooms connected to Internet:** The percentage of classrooms connected to the Internet is based on reporting by individual schools on the school profile forms. Schools were asked to report the number of classrooms and the fastest Internet connection in each classroom. It is possible that a number of schools reported more than one type of connection in classrooms where more than one type exists. If this is the case, then the percentage reported here for those districts will be higher than the actual percentage of classrooms connected. Revisions will be made to the June 2001 *Tech Plan Update* to clarify the questions, resulting in more accurate statistics.

**Number of Computers per 1 FTE Tech Support:** On the Baseline Data Collection Form, districts reported the number of FTE (full-time equivalent) for network/technical support and maintenance and repair specialist. They reported numbers separately for district staff, contracted services, and other (volunteers, students, aides, paraprofessionals, etc.). The ratios reported here are based on the numbers of FTE reported for district staff and contracted services during the 1999-2000 school year. The ratios are also based on the total number of computers in the district (Types A, B, and C), used for instruction and administration, that were updated on the district and school profiles in October 2000. To get a more accurate picture of technical support, districts should recalculate this ratio to accommodate any additional technical staff employed by the district at the beginning of the 2000-2001 school year.

**Number of Staff per 0.5 Curriculum Integration:** These ratios are based on the district staff FTE for curriculum integration

reported by the districts on the Baseline Data Collection Form. Numbers reported for contracted services and "other" (technology aides, tutors, volunteers, etc.) were not used in these ratios. The total number of district staff used in calculating this ratio includes administrators, teachers, and support staff for the school year 1999-2000, as reported by the districts on the Baseline Data Collection Form. When districts reported FTE curriculum integration on the Baseline Data Collection Form, they were instructed to report only the portion of time a person spends on that technology task. For example, a library teacher who works full time should not be counted as 1 FTE curriculum integration if that person spends only 25% of his/her time providing technology curriculum integration support to staff and 75% of his/her time working with students. Likewise, if a full-time staff member is providing guidance and curriculum integration support to staff 100% of his/her time, then that person should be counted as 1 FTE. We know from anecdote that many districts need more curriculum integration support than they have been able to provide; however the statistics, as drawn from current data, would lead one to think that many districts have achieved the benchmark standard for curriculum integration support. It is highly likely that many districts misunderstood how to report FTE for curriculum integration, which has lead to inflated statistics.

| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000)<br>NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| Beverly | Jul-00 | 10.76 | 7.61 | 46 | 640.18 | 54.14 |
| Billerica | Aug-00 | 19.91 | 12.18 | 42 | 282.50 | 18.00 |
| Boston | Oct-00 | 5.29 | 4.54 | 57 | 532.00 | 250.00 |
| Bourne | Oct-00 | 4.18 | 3.97 | 99 | 702.00 | 50.00 |
| Boxborough | Oct-00 | 4.21 | 4.08 | 100 | 368.00 | 150.00 |
| Boxford | Oct-00 | 4.69 | 3.67 | 100 | 1575.00 | 78.00 |
| Boylston | Oct-00 | 2.14 | 2.14 | 100 | 63.33 | 15.00 |
| Braintree | Oct-00 | 6.31 | 4.20 | 54 | 653.50 | 17.41 |
| Brewster | Nov-00 | 5.75 | 4.23 | 100 | 826.92 | 94.17 |
| Brimfield | Oct-00 | 5.07 | 5.07 | 100 | 73.00 | 25.00 |
| Brockton | Oct-00 | 7.73 | 6.93 | 36 | 1381.00 | 334.50 |
| Brookfield | Oct-00 | 3.99 | 3.99 | 100 | 91.00 | 27.00 |
| Brookline | Jul-00 | 5.42 | 4.57 | 87 | 250.00 | 27.59 |
| Burlington | Oct-00 | 4.59 | 3.70 | 100 | 345.00 | 14.88 |
| Cambridge | Nov-00 | 4.97 | 3.88 | 97 | 622.25 | 39.77 |
| Canton | Oct-00 | 2.70 | 2.85 | 100 | 265.25 | 25.00 |
| Carlisle | Jul-00 | 15.13 | 5.39 | 20 | 430.00 | 31.67 |
| Carver | Oct-00 | 7.60 | 6.56 | 100 | 380.00 | 53.50 |
| Chatham | Oct-00 | 1.99 | 1.99 | 100 | 382.00 | 11.60 |
| Chelmsford | Oct-00 | 3.02 | 2.83 | 88 | 496.75 | 38.89 |
| Chelsea | Oct-00 | 5.31 | 4.92 | 98 | 418.00 | 29.36 |
| Chicopee | Oct-00 | 7.01 | 6.28 | 98 | 291.20 | 9.32 |

| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000)<br>NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| Clarksburg | Oct-00 | 12.22 | 7.59 | 100 | 340.00 | 0 FTE |
| Clinton | Oct-00 | 3.32 | 2.77 | 99 | 709.09 | 108.50 |
| Cohasset | Oct-00 | 6.44 | 5.11 | 100 | 586.00 | 24.00 |
| Concord | Oct-00 | 5.25 | 4.32 | 100 | 371.33 | 31.70 |
| Conway | Oct-00 | 23.43 | 6.07 | 100 | 0 | 95.00 |
| Danvers | Oct-00 | 5.46 | 5.31 | 82 | 368.40 | 60.83 |
| Dartmouth | Oct-00 | 6.96 | 4.89 | 99 | 631.33 | 101.25 |
| Dedham | Oct-00 | 4.45 | 4.45 | 100 | 376.50 | 25.38 |
| Deerfield | Oct-00 | 7.24 | 5.48 | 100 | 180.00 | 100.00 |
| Douglas | Oct-00 | 9.13 | 7.43 | 100 | 426.00 | 130.00 |
| Dover | Oct-00 | 8.35 | 8.11 | 55 | 117.00 | 16.00 |
| Dracut | Oct-00 | 10.15 | 8.46 | 100 | 554.00 | 35.22 |
| Duxbury | Oct-00 | 5.49 | 4.21 | 100 | 427.50 | 43.33 |
| East Bridgewater | Nov-00 | 4.88 | 4.28 | 100 | 6470.00 | 90.00 |
| Eastham | Oct-00 | 16.95 | 5.28 | 100 | 850.00 | 26.50 |
| Easthampton | Oct-00 | 4.91 | 4.78 | 72 | 227.50 | 20.33 |
| East Longmeadow | Jul-00 | 5.95 | 5.76 | 78 | 322.00 | 184.00 |
| Easton | Oct-00 | 8.18 | 6.93 | 100 | 454.89 | 235.00 |
| Edgartown | Oct-00 | 2.54 | 2.41 | 100 | 100.00 | 3.75 |
| Erving | Oct-00 | 2.49 | 2.15 | 100 | 100.00 | 38.00 |
| Essex | Oct-00 | 4.14 | 4.05 | 100 | 315.15 | 92.42 |
| Everett | Oct-00 | 9.11 | 6.23 | 36 | 0 | 16.12 |

| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000)<br>NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| Fairhaven | Oct-00 | 6.99 | 6.23 | 100 | 201.50 | 22.13 |
| Fall River | Oct-00 | 12.60 | 8.04 | 14 | 1154.00 | 434.67 |
| Falmouth | Oct-00 | 11.63 | 7.64 | 57 | 194.12 | 58.09 |
| Fitchburg | Oct-00 | 8.57 | 7.14 | 75 | 358.52 | 129.22 |
| Florida | Oct-00 | 6.12 | 5.47 | 50 | 0 | 27.42 |
| Foxborough | Oct-00 | 4.61 | 4.40 | 100 | 522.00 | 205.00 |
| Framingham | Oct-00 | 7.81 | 6.77 | 85 | 253.67 | 35.53 |
| Franklin | Oct-00 | 5.38 | 4.61 | 99 | 248.80 | 0 |
| Freetown | Oct-00 | 11.02 | 8.36 | 93 | 45.00 | 35.50 |
| Gardner | Oct-00 | 5.78 | 4.64 | 100 | 186.58 | 40.00 |
| Georgetown | Oct-00 | 3.85 | 3.85 | 100 | 108.25 | 30.83 |
| Gloucester | Oct-00 | 6.68 | 4.86 | 67 | 487.00 | 200.00 |
| Gosnold | Aug-00 | no data | no data | 0 | 0 | 0 |
| Grafton | Nov-00 | 9.60 | 5.75 | 81 | 363.33 | 20.80 |
| Granby | Oct-00 | 8.01 | 7.38 | 100 | 450.00 | 35.71 |
| Granville | Nov-00 | 4.00 | 3.32 | 100 | 0 | 17.00 |
| Greenfield | Oct-00 | 10.44 | 7.44 | 80 | 196.00 | 162.27 |
| Hadley | Oct-00 | 4.88 | 4.15 | 91 | 366.00 | 60.00 |
| Halifax | Oct-00 | 15.89 | 12.66 | 98 | 187.50 | 29.50 |
| Hancock | Oct-00 | 2.13 | 2.13 | 41 | 360.00 | 25.00 |
| Hanover | Oct-00 | 3.93 | 3.33 | 100 | 431.50 | 24.00 |
| Harvard | Oct-00 | 6.28 | 4.73 | 75 | 372.00 | 25.40 |

| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000)<br>NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| Harwich | Oct-00 | 6.32 | 5.41 | 82 | 609.09 | 470.00 |
| Hatfield | Jul-00 | 4.32 | 4.32 | 100 | 218.33 | 10.21 |
| Haverhill | Oct-00 | 9.63 | 5.10 | 57 | 487.75 | 41.85 |
| Hingham | Oct-00 | 5.78 | 5.38 | 100 | 1002.86 | 27.27 |
| Holbrook | Nov-00 | 53.07 | 5.12 | 100 | 0 | 20.75 |
| Holland | Oct-00 | 6.63 | 4.84 | 100 | 65.00 | 42.00 |
| Holliston | Oct-00 | 5.26 | 5.22 | 45 | 158.33 | 75.00 |
| Holyoke | Oct-00 | 5.62 | 4.38 | 99 | 1928.00 | 30.95 |
| Hopedale | Nov-00 | 5.69 | 5.41 | 100 | 1150 | 17.37 |
| Hopkinton | Oct-00 | 5.68 | 5.02 | 100 | 198.67 | 41.67 |
| Hudson | Oct-00 | 6.57 | 4.45 | 91 | 398.92 | 23.08 |
| Hull | Oct-00 | 6.91 | 5.89 | 78 | 298.00 | 30.36 |
| Ipswich | Oct-00 | 3.54 | 2.71 | 100 | 320.40 | 87.00 |
| Kingston | Oct-00 | 4.48 | 4.39 | 100 | 730.00 | 42.00 |
| Lakeville | Oct-00 | 5.32 | 4.75 | 92 | 86.50 | 43.00 |
| Lanesborough | Oct-00 | 6.82 | 5.36 | 100 | 680.00 | 50.00 |
| Lawrence | Oct-00 | 4.15 | 3.15 | 91 | 322.22 | 39.83 |
| Lee | Oct-00 | 5.62 | 4.99 | 100 | 800.00 | 240.00 |
| Leicester | Jul-00 | 7.30 | 7.10 | 97 | 231.54 | 485.00 |
| Lenox | Oct-00 | 4.53 | 4.14 | 100 | 665.00 | 32.13 |
| Leominster | Oct-00 | 9.18 | 8.52 | 35 | 632.50 | 57.14 |
| Leverett | Oct-00 | 6.18 | 3.84 | 86 | 224.00 | 50.00 |

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| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000)<br>NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| Lexington | Oct-00 | 6.48 | 4.88 | 98 | 482.67 | 102.13 |
| Lincoln | Oct-99 | 31.40 | 6.41 | 100 | 229.00 | 29.00 |
| Littleton | Oct-00 | 4.99 | 4.53 | 52 | 231.33 | 0 |
| Longmeadow | Oct-00 | 7.29 | 5.33 | 76 | 176.58 | 67.92 |
| Lowell | Nov-00 | 5.81 | 3.93 | 99 | 827.00 | 15.81 |
| Ludlow | Nov-00 | 10.64 | 6.94 | 18 | 125.00 | 450.00 |
| Lunenburg | Nov-00 | 8.99 | 7.02 | 60 | 1505.00 | 285.71 |
| Lynn | Oct-00 | 5.93 | 4.92 | 65 | 618.00 | 26.02 |
| Lynnfield | Oct-00 | 4.62 | 3.38 | 77 | 650.00 | 35.38 |
| Malden | Jun-00 | 1.25 | 1.25 | 62 | 1579.00 | 25.03 |
| Manchester | Oct-99 | 6.42 | 4.54 | 100 | 460.00 | 78.00 |
| Mansfield | Oct-99 | 10.11 | 8.60 | 99 | 241.76 | 90.32 |
| Marblehead | Oct-00 | 7.35 | 6.87 | 90 | 236.50 | 78.57 |
| Marion | Oct-00 | 7.11 | 6.49 | 68 | 180.00 | 88.00 |
| Marlborough | Oct-00 | 7.33 | 5.78 | 85 | 203.25 | 116.67 |
| Marshfield | Oct-00 | 20.49 | 14.28 | 35 | 53.86 | 18.75 |
| Mashpee | Jul-00 | 4.43 | 4.21 | 100 | 573.00 | 15.93 |
| Mattapoisett | Oct-00 | 7.48 | 6.29 | 86 | 0 | 0 |
| Maynard | Oct-00 | 8.45 | 6.48 | 100 | 120.87 | 97.27 |
| Medfield | Oct-00 | 8.57 | 6.71 | 100 | 232.00 | 29.67 |
| Medford | Jun-00 | 12.00 | 7.33 | 45 | 565.63 | 1000.00 |
| Medway | Oct-00 | 5.29 | 4.83 | 91 | 293.00 | 65.00 |

| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000)<br>NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| Melrose | Oct-00 | 5.72 | 5.07 | 70 | 330.00 | 175.00 |
| Methuen | Oct-00 | 2.89 | 2.82 | 100 | 758.67 | 72.70 |
| Middleborough | Oct-00 | 2.93 | 2.90 | 100 | 438.33 | 219.17 |
| Middleton | Jul-00 | 9.86 | 6.55 | 53 | 0 | 49.00 |
| Milford | Oct-00 | 8.40 | 7.56 | 70 | 1232.00 | 44.00 |
| Millbury | Jul-00 | 8.00 | 7.40 | 45 | 372.50 | 30.83 |
| Millis | Oct-00 | 4.85 | 3.38 | 100 | 288.00 | 66.50 |
| Milton | Oct-00 | 12.73 | 8.39 | 7 | 530.00 | 200.00 |
| Monson | Nov-00 | 7.58 | 4.17 | 100 | 567.14 | 255.00 |
| Nahant | Aug-00 | 8.85 | 3.97 | 100 | 75.00 | no data |
| Nantucket | Nov-00 | 6.57 | 5.10 | 100 | 149.74 | 27.50 |
| Natick | Oct-00 | 7.15 | 4.53 | 71 | 1096.00 | 78.13 |
| Needham | Oct-00 | 6.13 | 5.27 | 100 | 499.00 | 32.50 |
| New Bedford | Oct-00 | 6.20 | 4.79 | 66 | 680.40 | 76.25 |
| Newburyport | Oct-00 | 8.95 | 6.12 | 100 | 235.00 | 14.08 |
| Newton | Nov-00 | 9.54 | 6.14 | 70 | 760.00 | 20.98 |
| Norfolk | Oct-00 | 7.81 | 7.76 | 100 | 272.73 | 93.33 |
| North Adams | Oct-00 | 9.30 | 7.36 | 69 | 197.65 | 0 |
| Northampton | Oct-00 | 6.97 | 5.75 | 100 | 585.00 | 122.50 |
| North Andover | Oct-00 | 4.86 | 3.22 | 100 | 576.40 | 64.29 |
| North Attleborough | Oct-00 | 3.72 | 3.38 | 73 | 443.33 | 225.00 |
| Northborough | Oct-00 | 4.26 | 3.80 | 100 | 118.60 | 122.50 |

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| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000)<br>NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| Northbridge | Oct-00 | 5.82 | 4.79 | 93 | 283.00 | 41.00 |
| North Brookfield | Jun-00 | 3.43 | 3.42 | 100 | 63.25 | 17.50 |
| North Reading | Oct-00 | 11.47 | 8.24 | 47 | 222.50 | 19.43 |
| Norton | Oct-00 | 5.79 | 4.31 | 100 | 773.00 | 34.38 |
| Norwell | Oct-00 | 5.87 | 4.56 | 76 | 482.00 | 22.50 |
| Norwood | Oct-00 | 5.85 | 5.65 | 100 | 750 | 114 |
| Oak Bluffs | Oct-00 | 2.84 | 2.84 | 100 | 193.00 | 149.33 |
| Orange | Oct-00 | 3.25 | 2.94 | 100 | 311.00 | 40.00 |
| Orleans | Oct-00 | 5.88 | 5.88 | 100 | 380.00 | 12.00 |
| Oxford | Oct-00 | 11.25 | 8.49 | 95 | 97.00 | 87.00 |
| Palmer | Oct-00 | 5.52 | 5.38 | 100 | 154.33 | 43.33 |
| Peabody | Oct-00 | 7.19 | 6.18 | 46 | 536.36 | 140.91 |
| Pelham | Oct-00 | 4.48 | 4.19 | 75 | 366.67 | 27.68 |
| Pembroke | Oct-00 | 8.73 | 7.59 | 100 | 279.00 | 0 FTE |
| Petersham | Oct-00 | 6.38 | 5.67 | 100 | 86.67 | 17.00 |
| Pittsfield | Oct-00 | 5.72 | 4.78 | 99 | 396.00 | 230.00 |
| Plainville | Oct-00 | 3.66 | 3.66 | 100 | 1125.00 | 100.00 |
| Plymouth | Aug-00 | 3.17 | 3.04 | 100 | 1053.67 | 42.54 |
| Plympton | Oct-00 | 5.46 | 4.98 | 100 | 340.00 | 18.00 |
| Provincetown | Oct-00 | 1.71 | 1.61 | 100 | 200.00 | 175.00 |
| Quincy | Oct-00 | 10.76 | 6.17 | 100 | 1141.33 | 260.00 |
| Randolph | Oct-00 | 6.21 | 5.35 | 91 | 574.67 | 41.50 |

| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000)<br>NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| Reading | Oct-00 | 6.11 | 5.62 | 94 | 0 | 36.43 |
| Revere | Aug-00 | 3.13 | 2.99 | 100 | 584.75 | 28.55 |
| Richmond | Oct-99 | 5.75 | 3.83 | 32 | 0 | 0 |
| Rochester | Oct-00 | 5.12 | 4.74 | 100 | 228.00 | 76.00 |
| Rockland | Oct-00 | 5.01 | 4.19 | 100 | 177.41 | 35.17 |
| Rockport | Oct-00 | 4.31 | 3.51 | 100 | 694.00 | 42.89 |
| Rowe | Oct-00 | 1.11 | 0.85 | 100 | 1725.00 | 130.00 |
| Salem | Oct-00 | 6.61 | 4.07 | 63 | 1147.69 | 92.25 |
| Sandwich | Oct-00 | 5.74 | 5.74 | 89 | 400 | 30.00 |
| Saugus | Aug-00 | 7.05 | 6.46 | 56 | 345.29 | 20.65 |
| Savoy | Oct-00 | 5.89 | 5.30 | 80 | 70.00 | 30.00 |
| Scituate | Oct-00 | 8.92 | 8.09 | 100 | 0 | 36.00 |
| Seekonk | Oct-00 | 4.97 | 3.69 | 100 | 302.27 | 122.69 |
| Sharon | Oct-00 | 8.41 | 6.21 | 100 | 605.00 | 25.00 |
| Sherborn | Oct-00 | 6.34 | 4.84 | 100 | 300.00 | 16.00 |
| Shirley | Oct-00 | 15.66 | 7.25 | 94 | 210.00 | 70.00 |
| Shrewsbury | Oct-00 | 4.33 | 3.97 | 100 | 268.70 | 20.45 |
| Shutesbury | Oct-00 | 9.04 | 5.78 | 100 | 0 | 0 |
| Somerset | Oct-00 | 4.60 | 4.40 | 100 | 325.12 | 39.00 |
| Somerville | Nov-00 | 5.16 | 5.07 | 37 | 679.00 | 34.07 |
| Southampton | Nov-00 | 36.69 | 8.27 | 100 | 0 | 28.00 |
| Southborough | Oct-00 | 4.53 | 3.26 | 100 | 786.67 | 32.29 |

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|---|---|---|---|---|---|---|
| Southbridge | Jun-00 | 5.71 | 4.59 | 100 | 0 | 17.81 |
| South Hadley | Oct-00 | 11.04 | 8.36 | 83 | 337.00 | 63.80 |
| Springfield | Oct-00 | 5.08 | 4.30 | 43 | 701.20 | 56.11 |
| Stoneham | Oct-00 | 7.86 | 6.86 | 70 | 2540.00 | 62.50 |
| Stoughton | Oct-00 | 3.00 | 2.81 | 100 | 1582.00 | 61.40 |
| Sturbridge | Oct-00 | 7.30 | 5.41 | 100 | 162.00 | 26.75 |
| Sudbury | Oct-00 | 3.29 | 3.20 | 100 | 744.00 | 156.00 |
| Sunderland | Oct-00 | 6.04 | 4.58 | 100 | 440.00 | 112.50 |
| Sutton | Jul-00 | 2.50 | 2.46 | 100 | 365.00 | 46.33 |
| Swampscott | Oct-00 | 5.49 | 5.23 | 70 | 0 | 31.56 |
| Swansea | Oct-00 | 6.52 | 5.40 | 50 | 232.50 | 72.00 |
| Taunton | Oct-00 | 3.35 | 3.25 | 99 | 1980.00 | 16.44 |
| Tewksbury | Oct-00 | 6.16 | 4.47 | 43 | 878.33 | 67.08 |
| Tisbury | Oct-00 | 3.31 | 3.31 | 100 | 89.00 | 20.84 |
| Topsfield | Oct-00 | 4.72 | 4.72 | 100 | 0 | 76.67 |
| Truro | Oct-00 | 5.55 | 5.55 | 100 | 0 | 19.00 |
| Tyngsborough | Oct-00 | 8.44 | 5.07 | 71 | 0 | 24.10 |
| Uxbridge | Oct-00 | 8.04 | 6.71 | 95 | 382.00 | 530.00 |
| Wakefield | Nov-00 | 9.36 | 5.42 | 76 | 755.00 | 62.50 |
| Wales | Oct-00 | 16.31 | 8.15 | 100 | 32.00 | 23.00 |
| Walpole | Oct-00 | 6.61 | 5.43 | 57 | 167.60 | 78.70 |
| Waltham | Oct-00 | 10.50 | 7.84 | 35 | 295.00 | 26.02 |

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|---|---|---|---|---|---|---|
| Ware | Oct-00 | 4.03 | 3.64 | 69 | 426.00 | 12.40 |
| Wareham | Oct-00 | 4.75 | 4.34 | 100 | 610.67 | 87.14 |
| Watertown | Oct-00 | 6.12 | 4.18 | 100 | 308.00 | 123.64 |
| Wayland | Oct-00 | 6.50 | 5.50 | 100 | 193.33 | 71.22 |
| Webster | Oct-00 | 23.38 | 16.27 | 6 | 402.50 | 55.00 |
| Wellesley | Oct-00 | 4.19 | 3.67 | 100 | 129.78 | 67.67 |
| Wellfleet | Oct-00 | 4.55 | 4.15 | 19 | 335.00 | 13.13 |
| Westborough | Oct-00 | 4.37 | 4.34 | 100 | 400.00 | 75.00 |
| West Boylston | Oct-00 | 6.64 | 5.31 | 100 | 610.00 | 27.78 |
| W. Bridgewater | Oct-99 | 13.28 | 13.28 | 0 | 0 | 42.50 |
| Westfield | Oct-00 | 5.05 | 4.73 | 100 | 303.80 | 53.60 |
| Westford | Jul-00 | 12.17 | 6.57 | 100 | 301.20 | 18.28 |
| Westhampton | Nov-00 | 7.14 | 6.54 | 48 | 462.50 | 625.00 |
| Weston | Oct-99 | 2.87 | 2.51 | 100 | 936.00 | 15.38 |
| Westport | Oct-00 | 7.05 | 5.18 | 29 | 220.00 | 60.50 |
| West Springfield | Jul-00 | 6.43 | 5.01 | 65 | 451.00 | 51.10 |
| Westwood | Oct-00 | 7.29 | 6.00 | 92 | 796.67 | 78.13 |
| Weymouth | Oct-00 | 6.69 | 5.93 | 100 | 0 | 24.24 |
| Whately | Oct-00 | 4.72 | 4.03 | 100 | 420.00 | 70.00 |
| Williamsburg | Nov-00 | 3.82 | 3.08 | 100 | 910.00 | 18.75 |
| Williamstown | Oct-00 | 5.97 | 5.97 | 100 | 284.21 | 86.00 |
| Wilmington | Oct-00 | 5.00 | 4.62 | 78 | 423.50 | 125.00 |

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|---|---|---|---|---|---|---|
| Winchendon | Oct-00 | 6.05 | 5.64 | 100 | 0 | 41.67 |
| Winchester | Aug-00 | 13.80 | 9.89 | 69 | 170.22 | 13.83 |
| Winthrop | Oct-00 | 10.43 | 9.50 | 84 | 277.00 | 0 |
| Woburn | Oct-00 | 9.87 | 6.79 | 63 | 3132.00 | 83.67 |
| Worcester | Jul-00 | 4.15 | 3.80 | 99 | 588.25 | 15.10 |
| Wrentham | Oct-00 | 2.51 | 2.51 | 100 | 330.67 | 23.17 |
| Institutional Schools | Oct-00 | 0.00 | 0.00 | 26 | 0 | 31.43 |
| Northampton-Smith | Nov-00 | 4.49 | 3.00 | 100 | 0 | 35.50 |
| Academy Of Pacific Rim CS | Oct-00 | 4.70 | 4.70 | 100 | 83.33 | 75.00 |
| Benjamin Banneker CS | Oct-00 | 2.46 | 2.46 | 100 | 155.00 | 27.00 |
| Barnstable Grd 5 HMCS | Oct-00 | 5.75 | 4.06 | 100 | 118.00 | 41.00 |
| Boston Evening Acad HMCS | Oct-99 | no data | no data | 0 | 0 | no data |
| Cape Cod Lighthouse CS | Nov-00 | 3.78 | 3.70 | 100 | 183.33 | 37.50 |
| Champion HMCS | Oct-99 | no data | no data | 0 | 0 | no data |
| Chelmsford Alliance/Ed CS | Oct-00 | 6.50 | 6.50 | 100 | 0 | 13.00 |
| City On A Hill CS | Oct-00 | 2.52 | 2.34 | 100 | 0 | 165.00 |

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|---|---|---|---|---|---|---|
| Conservatory Lab CS | Oct-99 | no data | no data | 0 | 0 | no data |
| Community Day CS | Oct-00 | 6.52 | 4.30 | 100 | 162.86 | 70.00 |
| Sabis International | Oct-00 | 18.72 | 18.42 | 2 | 227.50 | 675.00 |
| Frederick Douglass CS | Oct-00 | 0.00 | 0.00 | 0 | 0 | no data |
| Neighborhood House CS | Oct-00 | 5.11 | 5.11 | 80 | 40.00 | 45.00 |
| Abby Kelley Foster Reg CS | Nov-00 | 16.82 | 16.82 | 100 | 0 | 35.50 |
| Sabis Foxboro Reg'l CS | Oct-00 | no data | 12.96 | 8 | 120.00 | 40.00 |
| Benjamin Franklin CS | Oct-00 | 13.92 | 13.92 | 100 | 68.00 | 0 |
| S.Boston Harbor Acad CS | Oct-00 | 4.00 | 4.00 | 15 | 1533.33 | 0 |
| Hilltown CS | Oct-00 | 8.38 | 7.79 | 0 | 180.00 | 110.00 |
| Robert M. Hughes CS | Oct-99 | no data | no data | 0 | 0 | no data |
| Health Careers Acad HMCS | Oct-99 | no data | no data | 0 | 0 | no data |

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|---|---|---|---|---|---|---|
| Lawrence Family Dev CS | Oct-00 | 13.84 | 7.66 | 100 | 328.00 | 4.50 |
| Lowell Community CS | Oct-00 | no data | no data | 0 | 0 | 0 |
| Lowell Middlesex Academy CS | Nov-00 | 11.11 | 11.11 | 0 | 750.00 | 0 |
| Lynn Community CS | Nov-00 | no data | 114.50 | 0 | 0 | 0 |
| Marblehead Community CS | Jun-00 | 2.98 | 2.98 | 100 | 160.25 | 14.00 |
| Martha's Vineyard CS | Oct-00 | 5.04 | 4.15 | 100 | 126.67 | 62.50 |
| Ma Academy Math & Science | Jul-00 | 4.33 | 2.00 | 100 | 540.00 | 13.00 |
| Media & Tech CS | Oct-00 | 0.00 | 0.00 | 0 | 0 | 0 |
| Mystic Valley Adv Reg CS | Oct-00 | 15.90 | 15.90 | 100 | 0 | 27.50 |
| New Leadership HMCS | Jul-00 | 5.27 | 5.27 | 0 | 82.00 | 0 |
| North Star Academy CS | Oct-99 | 9.30 | 9.30 | 20 | 400.00 | 0 |
| Francis W Parker CS | Aug-00 | 9.35 | 9.35 | 100 | 70.00 | 0 |

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|---|---|---|---|---|---|---|
| Pioneer Valley Perf Arts CS | Oct-00 | 11.04 | 11.04 | 45 | 64.00 | 0 |
| Boston Renaissance CS | Oct-00 | 3.59 | 3.59 | 100 | 567.00 | 0.50 |
| River Valley CS | Oct-00 | 11.36 | 11.36 | 100 | 0 | 0 |
| Rising Tide CS | Oct-00 | 5.38 | 5.38 | 100 | 4500.00 | 0 |
| Roxbury Preparatory CS | Oct-00 | 3.29 | 3.29 | 100 | 538.46 | 0 |
| Seven Hills CS | Oct-00 | 1.36 | 1.21 | 100 | 307.50 | 41.00 |
| Somerville CS | Oct-00 | 9.49 | 9.36 | 3 | 45.00 | 0 |
| South Shore CS | Jul-00 | 4.53 | 3.77 | 100 | 340.63 | 71.43 |
| Sturgis CS | N/A | no data | no data | no data | no data | no data |
| Atlantis CS | Oct-99 | 12.16 | 12.16 | 0 | 0 | 0 |
| Acton-Boxborough RSD | Oct-00 | 5.13 | 3.99 | 100 | 433.33 | 74.50 |
| Adams-Cheshire RSD | Oct-00 | 8.04 | 6.59 | 86 | 329.13 | 134.50 |
| Amherst-Pelham RSD | Oct-00 | 4.86 | 4.71 | 100 | 510.00 | 116.54 |

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|---|---|---|---|---|---|---|
| Ashburnham-Westminster RSD | Oct-00 | 6.39 | 6.33 | 88 | 356.00 | 112.00 |
| Athol-Royalston RSD | Oct-00 | 3.28 | 3.20 | 73 | 1018.67 | 99.50 |
| Berkshire Hills RSD | Oct-00 | 5.29 | 4.95 | 79 | 258.67 | 102.27 |
| Berlin-Boylston RSD | Oct-00 | 8.33 | 4.58 | 24 | 36.33 | 8.33 |
| Blackstone-Millville RSD | Oct-00 | 6.60 | 6.28 | 100 | 211.50 | 84.75 |
| Bridgewater-Raynham RSD | Oct-00 | 9.35 | 6.84 | 62 | 464.00 | 93.75 |
| Chesterfield-Goshen RSD | Nov-00 | 3.90 | 3.90 | 100 | 0 | 16.00 |
| Central Berkshire RSD | Oct-00 | 9.05 | 6.37 | 71 | 884.00 | 83.50 |
| Concord-Carlisle RSD | Oct-00 | 5.05 | 4.32 | 40 | 190.00 | 0 |
| Dennis-Yarmouth RSD | Oct-00 | 8.56 | 5.67 | 100 | 820.00 | 33.45 |
| Dighton-Rehoboth RSD | Oct-00 | 5.14 | 4.82 | 100 | 734.00 | 80.40 |
| Dover-Sherborn RSD | Oct-00 | 5.65 | 4.63 | 100 | 143.00 | 38.00 |

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|---|---|---|---|---|---|---|
| Dudley-Charlton RSD | Nov-00 | 5.30 | 4.69 | 100 | 827.00 | 20.86 |
| Nauset RSD | Oct-00 | 4.71 | 4.03 | 98 | 1222.50 | 15.86 |
| Farmington River RSD | Oct-00 | 3.31 | 3.31 | 100 | 560.00 | 21 11 |
| Freetown-Lakeville RSD | Oct-99 | 7.55 | 6.13 | 11 | 83.75 | 50.50 |
| Frontier RSD | Oct-00 | 1.86 | 1.83 | 100 | 350.00 | 42.00 |
| Gateway RSD | Oct-00 | 7.18 | 5.77 | 48 | 309.00 | 75 |
| Groton-Dunstable RSD | Oct-00 | 9.04 | 5.44 | 84 | 278.00 | 56.17 |
| Gill-Montague RSD | Oct-00 | 6.04 | 5.24 | 100 | 113.00 | 50.33 |
| Hamilton-Wenham RSD | Oct-00 | 4.19 | 2.99 | 80 | 720.00 | 40.91 |
| Hampden-Wilbraham RSD | Jun-00 | 6.29 | 5.20 | 100 | 298.80 | 186.15 |
| Hampshire RSD | Nov-00 | 3.97 | 3.44 | 100 | 272.00 | 23.00 |
| Hawlemont RSD | Oct-00 | 4.31 | 4.08 | 78 | 700.00 | 0 |
| King Philip RSD | Nov-00 | 4.83 | 4.17 | 100 | 2215.00 | 0 |
| Lincoln-Sudbury RSD | Oct-00 | 5.98 | 4.60 | 8 | 252.00 | 90.00 |

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|---|---|---|---|---|---|---|
| Manchester Essex RSD | Nov-00 | 5.45 | 4.83 | 100 | 594.00 | 78.00 |
| Marthas Vineyard RSD | Oct-00 | 2.55 | 2.36 | 100 | 213.71 | 101.82 |
| Masconomet RSD | Oct-00 | 5.28 | 5.18 | 60 | 113.43 | 16.43 |
| Mendon-Upton RSD | Oct-00 | 4.68 | 4.24 | 100 | 514.00 | 110.00 |
| Mount Greylock RSD | Oct-00 | 5.49 | 5.49 | 100 | 174.00 | 190.00 |
| Mohawk Trail RSD | Oct-00 | 4.46 | 3.48 | 99 | 1412.50 | 0 |
| Narragansett RSD | Oct-00 | 5.54 | 5.26 | 78 | 458.57 | 355.00 |
| Nashoba RSD | Nov-00 | 4.53 | 3.81 | 100 | 0 | 25.00 |
| New Salem-Wendell RSD | Oct-00 | 13.07 | 6.78 | 100 | 150.00 | 50.00 |
| Northboro-Southboro RSD | Oct-00 | 3.73 | 3.51 | 100 | 202.00 | 695.00 |
| North Middlesex RSD | Oct-00 | 6.90 | 5.50 | 97 | 428.00 | 28.33 |
| Old Rochester RSD | Oct-00 | 8.38 | 6.33 | 16 | 232.00 | 0 |
| Pentucket RSD | Nov-00 | 7.52 | 4.75 | 100 | 404.00 | 75.68 |
| Pioneer Valley RSD | Nov-00 | 8.30 | 5.84 | 52 | 0 | 18.25 |
| Quabbin RSD | Oct-00 | 10.21 | 8.14 | 50 | 445.00 | 36.50 |
| Ralph C Mahar RSD | Oct-00 | 6.21 | 4.93 | 94 | 228.75 | 183.33 |

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|---|---|---|---|---|---|---|
| Silver Lake RSD | Oct-00 | 6.25 | 5.42 | 100 | 623.00 | 28.08 |
| Southern Berkshire RSD | Oct-00 | 3.05 | 2.54 | 100 | 934.00 | 82.50 |
| Southwick-Tolland RSD | Jul-00 | 16.10 | 10.95 | 100 | 424.00 | 156.67 |
| Spencer-E Brookfield RSD | Oct-00 | 4.59 | 3.62 | 35 | 480.00 | 562.50 |
| Tantasqua RSD | Oct-00 | 7.40 | 5.33 | 93 | 345.00 | 28.67 |
| Triton RSD | Oct-00 | 6.50 | 5.16 | 65 | 491.33 | 23.75 |
| Up-Island RSD | Oct-00 | 2.97 | 2.72 | 100 | 68.67 | 10.63 |
| Wachusett RSD | Oct-00 | 3.31 | 3.15 | 100 | 763.67 | 46.88 |
| Quaboag RSD | Oct-00 | 7.90 | 3.91 | 71 | 454.00 | 37.17 |
| Whitman-Hanson RSD | Jul-00 | 3.40 | 3.17 | 100 | 940.50 | 158.25 |
| Assabet Valley Voc Tech | Oct-00 | 3.33 | 2.66 | 57 | 237.00 | 24.17 |
| Blackstone Valley Voc Tech | Oct-00 | 2.84 | 2.40 | 100 | 204.00 | 23.00 |
| Blue Hills Voc Tech | Oct-00 | 4.17 | 2.71 | 97 | 476.00 | 50.00 |
| Bristol-Plymouth Voc Tech | Oct-00 | 1.62 | 1.61 | 80 | 571.00 | 61.00 |

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|---|---|---|---|---|---|---|
| Cape Cod Region Voc Tech | Oct-00 | 2.36 | 2.20 | 100 | 501.52 | 120.00 |
| Franklin County Tech | Oct-00 | 2.28 | 1.53 | 100 | 704.00 | 495.00 |
| Greater Fall River RVT | Oct-00 | 2.18 | 2.10 | 100 | 0 | 0 |
| Greater Lawrence RVT | Oct-00 | 3.16 | 2.56 | 45 | 0 | 62.78 |
| Greater New Bedford Voc Tech | Nov-00 | 3.77 | 3.62 | 100 | 286.50 | 39.17 |
| Greater Lowell Voc Tec | Oct-00 | 3.03 | 3.03 | 100 | 237.67 | 116.00 |
| So Middlesex RVT | Oct-00 | 2.60 | 2.53 | 53 | 475.71 | 153.00 |
| Minute Man Voc Tech | Oct-00 | 2.48 | 1.95 | 99 | 1350.00 | 130.00 |
| Montachusett Voc Tech | Oct-00 | 3.00 | 2.29 | 100 | 306.86 | 76.50 |
| Northern Berkshire Voc | Oct-00 | 1.72 | 1.72 | 100 | 690.00 | 91.67 |
| Nashoba Valley Tech | Oct-00 | 7.20 | 2.95 | 100 | 520.00 | 44.50 |
| Northeast Metro Voc | Oct-00 | 4.08 | 4.08 | 4 | 172.00 | 102.50 |

| District Name | Date last updated | Ratio A/B computer<br>Student enrollment (1999-2000) / total A and B computers (as of last update) | Ratio all types computers (types A, B, and C)<br>Student enrollment (1999-2000) / total all type computers (as of last update) | Percentage of classrooms connected to Internet (any type access)<br>As of last update | Number of computers per 1 FTE tech support (provided by district staff and contracted services)<br>Total # computers in district (as of last update) / Tech Support FTE (1999-2000) | Number of staff per 0.5 FTE curriculum integration<br>Total # staff / 0.5 FTE curriculum integration (all data from 1999-2000) NOTE: FTE may have been overreported in some districts |
|---|---|---|---|---|---|---|
| North Shore Reg Voc Tech | Oct-00 | 3.28 | 3.04 | 100 | 164.00 | 19.25 |
| Old Colony Reg Voc Tech | Oct-00 | 3.15 | 2.94 | 100 | 816.00 | 75.00 |
| Pathfinder Voc Tech | Oct-00 | 3.20 | 3.20 | 100 | 2.69 | 1.75 |
| Shawsheen Valley Voc Tech | Oct-00 | 2.66 | 2.20 | 100 | 97.83 | 10.00 |
| Southeastern Reg Voc Tech | Aug-00 | 2.99 | 2.99 | 100 | 483.00 | 29.20 |
| South Shore Reg Voc Tech | Oct-00 | 3.99 | 3.35 | 32 | 223.75 | 21.80 |
| Southern Worcester Cty Voc Tech | Oct-00 | 4.70 | 4.28 | 85 | 91.00 | 36.25 |
| Tri County | Jul-00 | 1.96 | 1.90 | 100 | 718.18 | 32.50 |
| Upper Cape Cod Voc Tech | Jul-00 | 2.50 | 2.17 | 100 | 223.20 | 10.75 |
| Whitter Voc | Oct-00 | 2.27 | 2.17 | 100 | 234.55 | 26.75 |
| Bristol Cty Agri | Oct-00 | 12.31 | 12.31 | 0 | 270.00 | 30.00 |
| Essex Agri Tech | Oct-00 | 4.16 | 2.78 | 84 | 132.00 | 74.00 |
| Norfolk County Agri | Nov-00 | 6.07 | 6.07 | 3 | 104.00 | 18.00 |
| **AVERAGE** | | **5.60** | **4.70** | **0.79** | **357.87** | **39.13** |

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# Massachusetts Department of Education

This document was prepared by the Massachusetts Department of Education
Dr. David P. Driscoll, Commissioner of Education

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